

What is Claimed:

SUBA²

1. A method of transmitting data packets over a bi-directional contention and reservation based network, the network including an operably linked system controller for receiving upstream channel packets and originating downstream channel packets, at least one operably linked remote terminal for receiving the downstream channel packets and originating the upstream channel packets, the network providing periodically allocated grants from the system controller to the at least one remote terminal in the downstream channel for scheduling data packet transfers in the upstream channel, the periodically allocated grants having a bandwidth size, and the network providing dynamically allocated grants from the system controller to the at least one remote terminal in the downstream channel upon request of the at least one remote terminal for scheduling data packet transfers in the upstream channel, the dynamically allocated grants being of a requested bandwidth size, the method comprising

determining whether the bandwidth size of a data packet of a stream of packets to be transmitted from the at least one remote terminal through the upstream channel is greater than the size of the periodically allocated grant, and, if so;

requesting the dynamically allocated grant, the requested dynamically allocated grant being of a bandwidth size equivalent to the bandwidth size by which the data packet exceeds the size of the periodically allocated grant;

transmitting a first portion of the data packet in response to the periodically allocated grant along with the dynamically allocated grant request; and

transmitting a remaining portion of the data packet in response to a next available grant.

2. The method of claim 1 further comprising:

determining whether a combined bandwidth size of the remaining portion of the data packet and a subsequent data packet of a stream of data packets to be transmitted from the at least one remote terminal through the upstream channel is greater than the size of the next available grant, and, if so;

6 transmitting at least the remaining portion of the data packet in response
7 to the grant, and, where the grant is a periodically allocated grant;

8 requesting a further dynamically allocated grant along with the
9 transmission of the at least remaining portion, the requested dynamically allocated
10 grant being of a bandwidth size by which the remaining portion of the data packet and
11 the subsequent data packet exceed the size of the next available grant; and

12 transmitting at least the remaining portion of the subsequent data packet
13 in response to a next available grant.

1 3. The method of claim 1 wherein the bandwidth size of a data packet
2 of a stream of packets is determined by storing the data packet in a buffer of the at
3 least one remote terminal and the bandwidth size of the stored data packet is
4 determined by comparing the bandwidth size of the buffer contents to at least one
5 bandwidth size threshold value.

1 4. The method of claim 1 wherein the remaining portion is
2 transmitted in response to the dynamically allocated grant corresponding to the
3 request.

1 5. The method of claim 1 wherein the first portion bandwidth size is
2 less than or equal to about the bandwidth size of the periodically allocated grant.

1 6. The method of claim 1 wherein the packet data is compressed video
2 data.

1 7. The method of claim 6 wherein the video is compressed pursuant to
2 the motion picture experts group standard (MPEG).

1 8. The method of claim 1 wherein the network is data over cable system
2 interface (DOCSIS) compliant.

1 9. The method of claim 1 wherein the request resides in an extended
2 header of the first portion transmission.

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1 10. A method of transmitting variable bit rate data packets over a bi-
2 directional contention and reservation based network, the network including an
3 operably linked system controller for receiving upstream channel packets and
4 originating downstream channel packets, at least one operably linked remote terminal
5 for receiving the downstream channel packets and originating the upstream channel
6 packets, the network providing periodically allocated grants from the system
7 controller to the at least one remote terminal in the downstream channel for
8 scheduling data packet transfers in the upstream channel, the periodically allocated
9 grants having a bandwidth size, and the network providing dynamically allocated
10 grants from the system controller to the at least one remote terminal in the
11 downstream channel upon request of the at least one remote terminal for scheduling
12 data packet transfers in the upstream channel, the dynamically allocated grants being
13 of a requested bandwidth size, the method comprising:

14 decomposing a first variable bit-rate data packet of a stream of data
15 packets to be transmitted from the at least one remote terminal through the upstream
16 channel into a constant bit-rate packet portion and a variable bit-rate packet portion,
17 the constant bit-rate packet portion having a bandwidth size substantially equal to the
18 average bit-rate of the stream of packets;

19 determining whether the bandwidth size of the decomposed packet is
20 greater than the size of the periodically allocated grant, and, if so;

21 requesting a dynamically allocated grant, the requested dynamically
22 allocated grant substantially equal in bandwidth size to the variable bit-rate packet
23 portion;

24 transmitting the constant bit-rate packet portion in response to a
25 periodically allocated grant; and

26 transmitting the variable bit-rate packet portion in response to a next
27 available grant.

1 11. The method of claim 10 wherein the bandwidth size of a data
2 packet of a stream of packets is determined by storing the data packet in a buffer of
3 the at least one remote terminal and the bandwidth size of the stored data packet is

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4 determined by comparing the bandwidth size of the buffer contents to at least one
5 bandwidth size threshold value.

1 12. The method of claim 10 wherein the variable bit-rate packet
2 portion is transmitted in response to the dynamically allocated grant corresponding to
3 the request.

1 13. The method of claim 10 wherein the variable bit rate packet data
2 is compressed video data.

1 14. The method of claim 13 wherein the video is compressed pursuant
2 to the motion picture experts group standard (MPEG).

1 15. The method of claim 10 wherein the network is data over cable
2 system interface (DOCSIS) compliant.

1 16. The method of claim 10 wherein the request resides in the
2 extended header of the constant bit-rate packet.

1 17. A method of dynamically adjusting the size of a periodically
2 allocated grant of a bi-directional contention and reservation based cable network, the
3 method comprising:

4 determining an average bandwidth size of an unused portion of the
5 periodically allocated grant;

6 determining an average bandwidth size of requested dynamically
7 allocated grants; and

8 adjusting the bandwidth size of the periodically allocated grant based on
9 the measured sizes and at least two predetermined thresholds.

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